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## COMPLETE SPECIFICATION

### The Formation of Packets of Particulate Substance

We, PROCTER & GAMBLE LIMITED a British company of Hedley House, Gosforth, Newcastle-upon-Tyne 3, formerly Thomas Hedley & Co. Limited, a British Company of Phoenix Buildings, Collingwood Street, Newcastle upon Tyne, 1, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the packaging of particulate materials in film-like substances. It is applicable generally to this field; but it will be described in connection with the formation of packets of granular detergent substances in films which, if desired, may be water soluble films, e.g. polyvinyl alcoholic films. One application of the invention is the provision of packages containing measured quantities of detergent suitable for introduction as such into a washing machine or the like where the films dissolve in the washing water.

Furthermore, it will be described with particular reference to the type of packeting operation in which a first stretchable film strip is led onto a moving member shaped to present recesses and intermediate lands. The film strip is caused to adhere to the lands; the vacuum is drawn in the recesses through one or more connections between the bases of the recesses and a vacuum source. The film strip, being in distortable condition, is drawn into the recesses so as to form pockets in the strip. The strip pockets are then filled with the granular material to be packaged, after which a second film strip in undistorted condition is led onto the moving member and is sealed to the first strip on the lands. The packet composite may be separated into individual packets along lines of severance across the lands.

In the formation of packets in the way above  
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described or in other ways, air is likely to be entrapped with the contents in the packets. The result is that the packets appear not to be full. Moreover, they are not flat-sided and firmly packed; and it becomes difficult to assemble them in an outer box or carton to provide a unit for sale.

It is an object of this invention to provide packets and a method of making them which avoid these difficulties.

It is an object of the invention to provide packets which are flat-sided, firm and suitable for cartoning with automatic machinery.

According to the invention a process of forming packets of particulate material comprises deforming a first film strip so as to form a pocket therein, forming a small puncture through the wall of the pocket, placing the material in the pocket, placing a second film strip over the first film strip so that the material in the pocket is enclosed between the two film strips, sealing the film strips together to form a packet, and withdrawing excess air from the packet through the puncture.

The invention further provides an apparatus for use in the process of the invention comprising a moving member having recesses formed therein with lands surrounding the recesses, each recess having at least one vacuum port and a means for forming a puncture through the wall of a pocket formed by a film strip placed on the moving member and deformed into the recess at a point intermediate the edges of one of the vacuum ports in the recess.

The first film strip may be deformed by being distended into a recess in a moving member, the deformed portion of said film strip being maintained in the recess by a vacuum. The vacuum may be used to distend the first film strip.

The vacuum may be applied through a vacuum port located in the moving member

and terminating at the recess, the puncture being formed in a portion of the first film strip lying over the vacuum port.

In a preferred form of the process of the invention, the moving member has a plurality of recesses and vacuum ports, the recesses being surrounded by lands; there is at least one vacuum port for each recess. The pockets are formed by causing portions of the first film strip in softened condition to be deformed into the recesses and maintained in the deformed condition by vacuum. A small puncture is formed through the film strip within each recess over a vacuum port therein. The deformed portions of the first film strip are filled with the material to be packaged, the second film strip is led over the first on the moving member and is sealed to such first film strip on the lands, and the vacuum is maintained so as to retain each pocket in its recess until sufficient air has been withdrawn by the vacuum from the pocket through the puncture.

In the apparatus hitherto used for forming packets containing granular detergents the fill is usually volumetric. The granular products being packaged may from time to time vary in density. When this occurs the volumetric fill is varied to compensate for the variations in density. Consequently some compromise must be made to ensure the ability to fill a packet with minimum density product. This means that the amount of air entrapped in the packets is of necessity variable from time to time. It is an advantage of this invention that it provides means and a process for forming flat-sided firm packets despite variations in the volume of the fill.

Reference is made to the accompanying drawing wherein:—

Figure 1 is a partial sectional view of a moving member, showing a form of means for forming the puncture;

Figure 2 is a partial plan view of the moving member showing the pockets formed in the first film strip when the latter is deformed into the recesses of the moving member;

Figure 3 is a partial sectional view of a moving member, showing another form of means for forming the puncture.

Attempts have been made in the past to provide a method for eliminating excess air in packets. In such attempts, the packets are sealed except for a narrow passageway. Air in the packets is withdrawn through the passageway, and the passageway is then sealed. However, this procedure requires elaborate apparatus and process to be used, including a double sealing operation, and does not always produce a satisfactory effect.

If a sealed packet is formed containing excess air, it is possible to prick the packet as with a pin. This will allow the excess air to escape, particularly if the packet is subjected to compression on its upper and

lower sides. But the action occurs too slowly to be of any commercial significance.

On the other hand, it is not possible to form minute holes in the film strips before the packaging operation. If the first film strip is punctured it cannot be drawn into the pockets of the moving member, but instead will split and tear. If the second film strip is punctured, there will be no tendency for excess air to escape from the packets until after their discharge from the machine.

It has been found, however, that a satisfactory result may be obtained if the first film strip is punctured after it has been drawn down into the pockets of the moving member. As long as this puncturing is done over or in the middle of one of the vacuum ports, the pocket previously formed in the first film strip will be maintained by the vacuum and the film substance will neither split nor tear despite any residual strains in the distorted film. It is believed that this is because the film is held tightly about the periphery of the vacuum port in the middle of which the puncture has been made, so that there is no transmission of stresses to this immediate portion of the film. The film pocket may then be filled with the desired material, and the second film strip led against it and sealed to it on the lands. A partial vacuum is applied to the interior of the packet through the puncture. This exhausts excess air, and external atmospheric pressure forces the top covering strip inwardly against the granules, compacting them into a mass of greater density. The packet thus becomes temporarily a relatively rigid body of uniform shape which is readily handled by automatic machinery. The exertion of slight pressure on edge portions of the packet relieves this rigidity so that as an incident to the cartoning of the packets they are capable of being slightly reshaped so as to fit better in the receiving structure.

Needless to say, the size of the puncture in the first film strip will normally be less than the granule size so as to prevent loss of contents. Otherwise the size of the opening is not critical. Excellent results have been attained by puncturing means of the diameter of ordinary pins such as are used for holding cloth together.

In Figures 1 and 2, the numeral 1 indicates a moving member which in this instance may be a drum. The moving member is shaped to provide recesses 2 separated by intermediate transverse lands 3. The moving member has longitudinal lands 4 and 5; and if pockets are formed abreast in the moving member there will be intermediate lands 6. A first thermoplastic film strip 7 is led onto the moving member in a distortable or heat softened condition and caused to adhere to the lands as it is known in this art. The portions of the film strip between the lands are drawn down into the recesses of the moving member 1

because of the evacuation of the recesses through one or more vacuum ports indicated at 8, 9 and 10. A form of puncturing device is illustrated in Figure 1, comprising a spider having arms 11 ending in points or pricking means 12. The spider is mounted on a shaft 13 which is driven in timed sequence with the moving member 1 in such a way that one of the points 12 punctures the film in a preformed film pocket 14 in a position over one of the vacuum ports. The film pocket is maintained in shape within the corresponding recess of the moving member 1, the size of the puncture in the film being insufficient to relieve the vacuum. While three vacuum openings or ports have been illustrated for each recess more or fewer may be provided as desired, and in particular excellent results have been obtained with only one vacuum opening or port per recess.

In Figure 3, where parts corresponding to those in Figure 1 and have been given corresponding index numerals, a somewhat modified structure is shown. Here a pricking means 15 is supported by a spider 16 in an annulus 17 threaded or otherwise engaged in the vacuum port 9. The use of the spider prevents the closing off of the vacuum port 9. The location of the parts is such that the pocket 14 will be formed in the lower film strip 7 before the film is punctured by the point 15. The pocket will be maintained by a continuation of the vacuum as aforesaid. When the second film strip 18 is led onto the filled pocket 14 and sealed to it on the lands of the moving member 1, excess air in the packet will be withdrawn through the puncture formed by the point 15. The atmospheric air pressure will draw the portion 18a of the second strip down tightly against the granular contents of the pocket, compacting the package. In Figure 3 the portion 18a of the second film strip is shown concaved, a condition which will obtain when the fill is somewhat slack. For the sake of clarity in Figure 3 the granular contents of the packet have not been illustrated.

#### WHAT WE CLAIM IS:—

1. A process of forming packets of particulate material comprising deforming a first film strip so as to form a pocket therein, forming a small puncture through the wall of the pocket, placing the material in the pocket, placing a second film strip over the first film strip so that the material in the pocket is enclosed between the two film strips, sealing the film strips together to form a packet, and withdrawing air from the packet through the puncture.

2. A process according to claim 1 in which the first film strip is deformed by being distended into a recess in a moving member, the deformed portion of said film strip being maintained in the recess by vacuum.

3. A process according to claim 2 in which

the vacuum is applied through a vacuum port located in the moving member and terminating at the recess, and in which the puncture is formed in a portion of the first film strip lying over the vacuum port and intermediate the edge portions of the vacuum port.

4. A process according to claim 3 in which the moving member has a plurality of the recesses and the vacuum ports, the recesses being each surrounded by lands, there being at least one vacuum port for each recess.

5. A process according to claim 4 comprising forming the pockets by causing portions of the first film strip while in softened condition to be deformed into the recesses and maintained in the deformed condition by vacuum, forming a small puncture through the film strip within each recess of over a vacuum port therein, filling the deformed portions of said film strip with the material, leading the second film strip on to the moving member and sealing it to the first film strip on the lands, and maintaining the vacuum so as to retain each packet in its recess until sufficient air has been withdrawn by the vacuum from the packet through the puncture.

6. A process according to any of the preceding claims wherein the puncture is of such size as to prevent the material from sifting through it.

7. Apparatus suitable for use in the process according to any of the preceding claims comprising a moving member having recesses formed therein with lands surrounding the recesses, each recess having at least one vacuum port, and means for puncturing a film strip placed on the moving member and deformed into the recesses, the puncturing being effected at a point intermediate the edges of one of the vacuum ports in each recess.

8. Apparatus according to claim 7 in which the puncturing means is outside the moving member and travels in time sequence therewith.

9. Apparatus according to claim 7 in which the puncturing means comprises a pricking point mounted substantially centrally of the vacuum port and so located as to puncture the film strip upon substantially complete deformation, thereof within the corresponding recess.

10. Apparatus according to any of claims 7—9 comprising means for causing a first film to adhere to the lands, surrounding a recess, means for filling each pocket with the material, means for thereafter leading a second film over the first film and sealing such a second film to the first film on the edge portions adhering to the lands to form a packet in the recess while applying partial vacuum to the interior of the packet through the puncture therein so as to exhaust excess air from the packet, whereby external air pressure forces the second film inwardly against the material in the pocket to form a firm, flat-sided and relatively rigid packet.

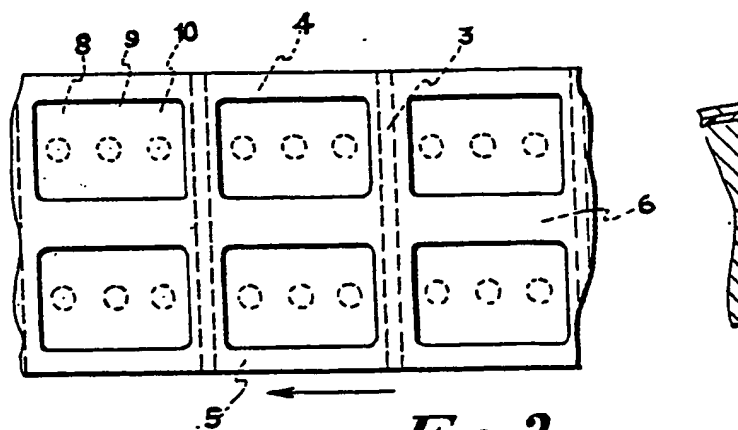
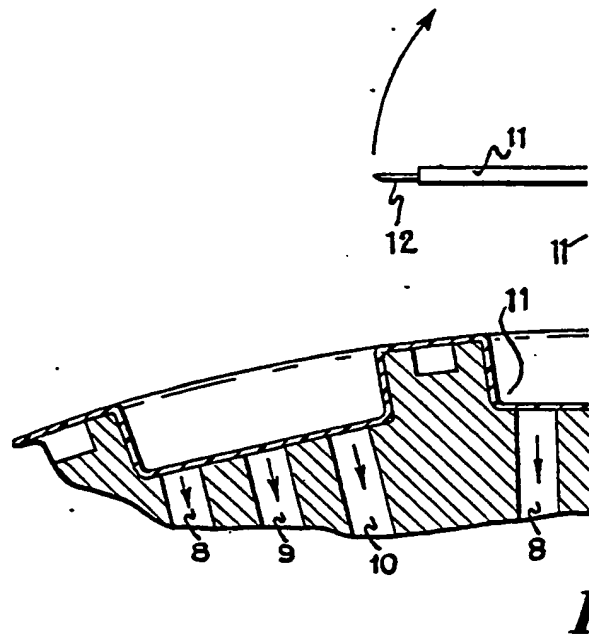
11. A process of forming packets of particulate material substantially as hereinbefore described.

- 5 12. Apparatus for forming packets of granular material substantially as hereinbefore described with reference to the drawing.

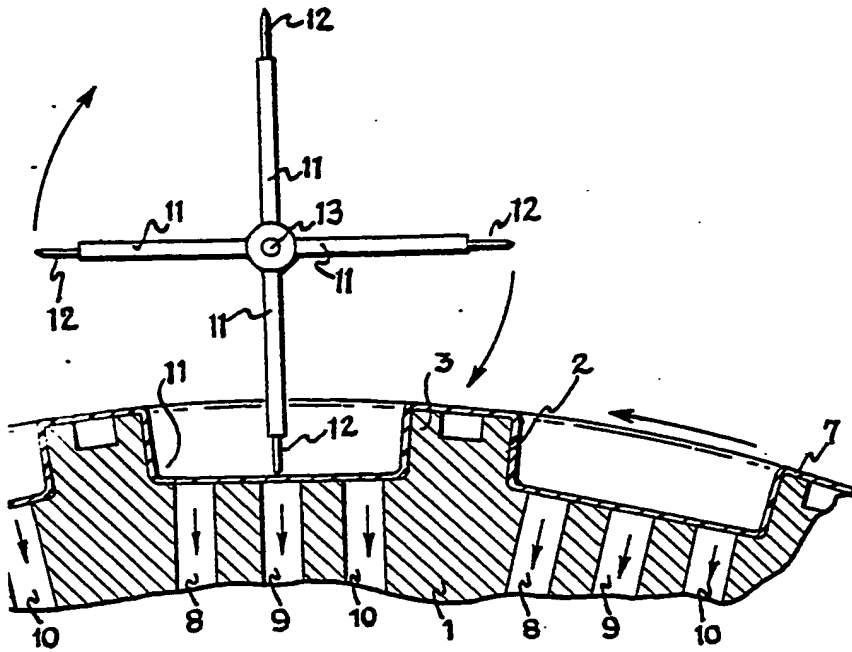
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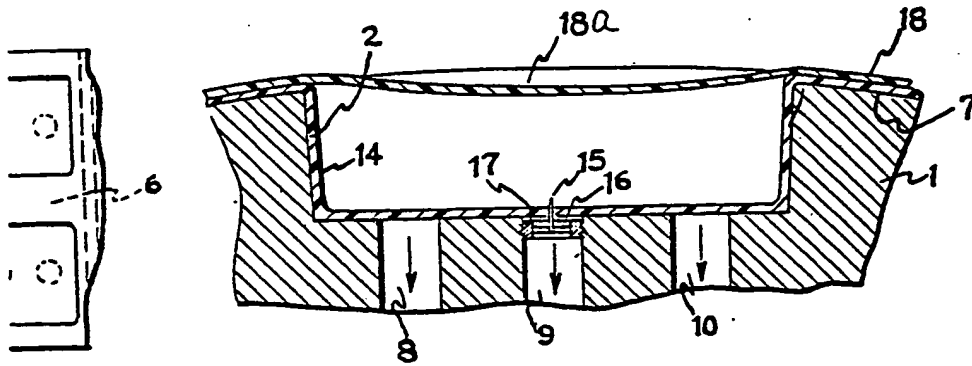
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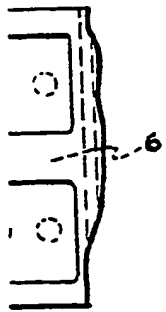
**FIG. 2.**



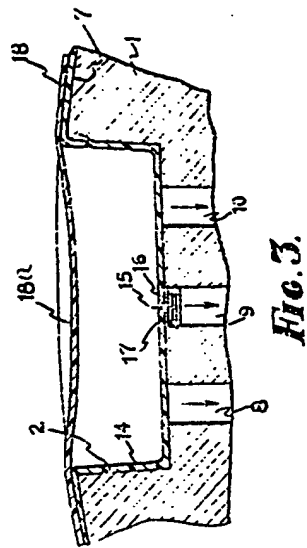
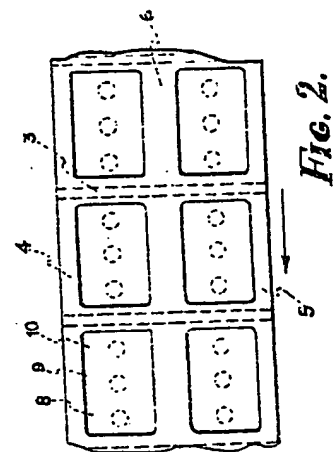
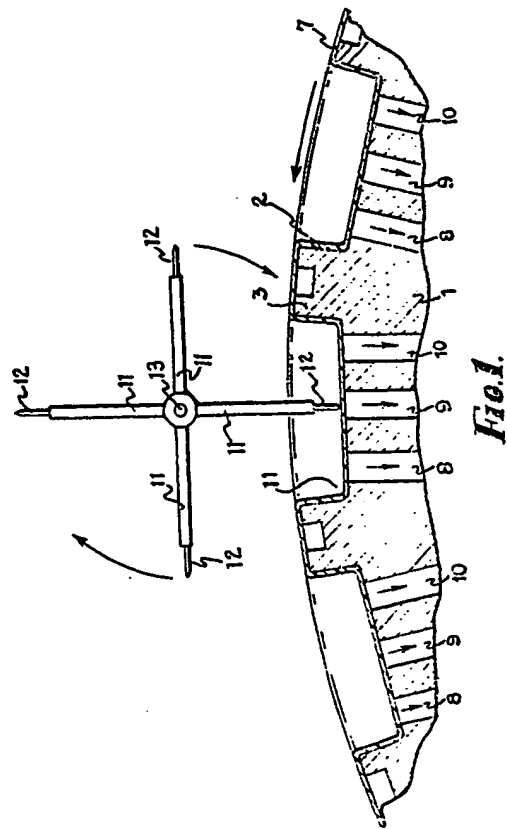
**Fig. 1.**



**Fig. 3.**



**2.**



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